STONINGTON HARBOR
STONINGTON, CONNECTICUT

SMALL BOAT NAVIGATION PROJECT
INITIAL APPRAISAL REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS 02254

March 1986

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

This initial appraisal report summarizes the findings of our recent preliminary engineering and economic feasibility study of navigation improvements in Stonington Harbor, Stonington, Connecticut.

Stonington Harbor as shown in Figure 1, is located in southeastern Connecticut approximately 12 miles east of New London, Connecticut and about 5 miles west of the Rhode Island state line. Stonington Harbor lies entirely within the town of Stonington. The harbor opens to the south into Fishers Island Sound and is bordered by Wamphassuck Neck to the west and Stonington center to the east. The harbor services a sizeable permanent and transient commercial fishing fleet and an extensive seasonal recreational boating fleet. The mean tidal range is 2.7 feet.

The town of Stonington requested that the Corps of Engineers study the feasibility of Federal participation in improving navigation conditions in Stonington Harbor under existing continuing authorities for small navigation projects. The town expressed specific concern over protection of the commercial fleet based at the Town Dock.

During the course of the initial appraisal study, the town's request for a state grant to fund a harbor management study was approved. At that time it was agreed between the town of Stonington and the Corps that the initial appraisal study would be delayed in order to allow the town and its consulting engineering firm to evaluate harbor needs and future development. During the study, Corps personnel attended meetings and had contact with the consulting firm to maintain coordination. At the conclusion of the harbor management study, the Corps' initial appraisal study was reactivated. Stonington's harbor study was consulted as a guide in formulation of the navigation improvement plan chosen for evaluation in this report.

The geographic scope of this study was generally limited to Stonington Harbor, the town of Stonington, and the immediate area.

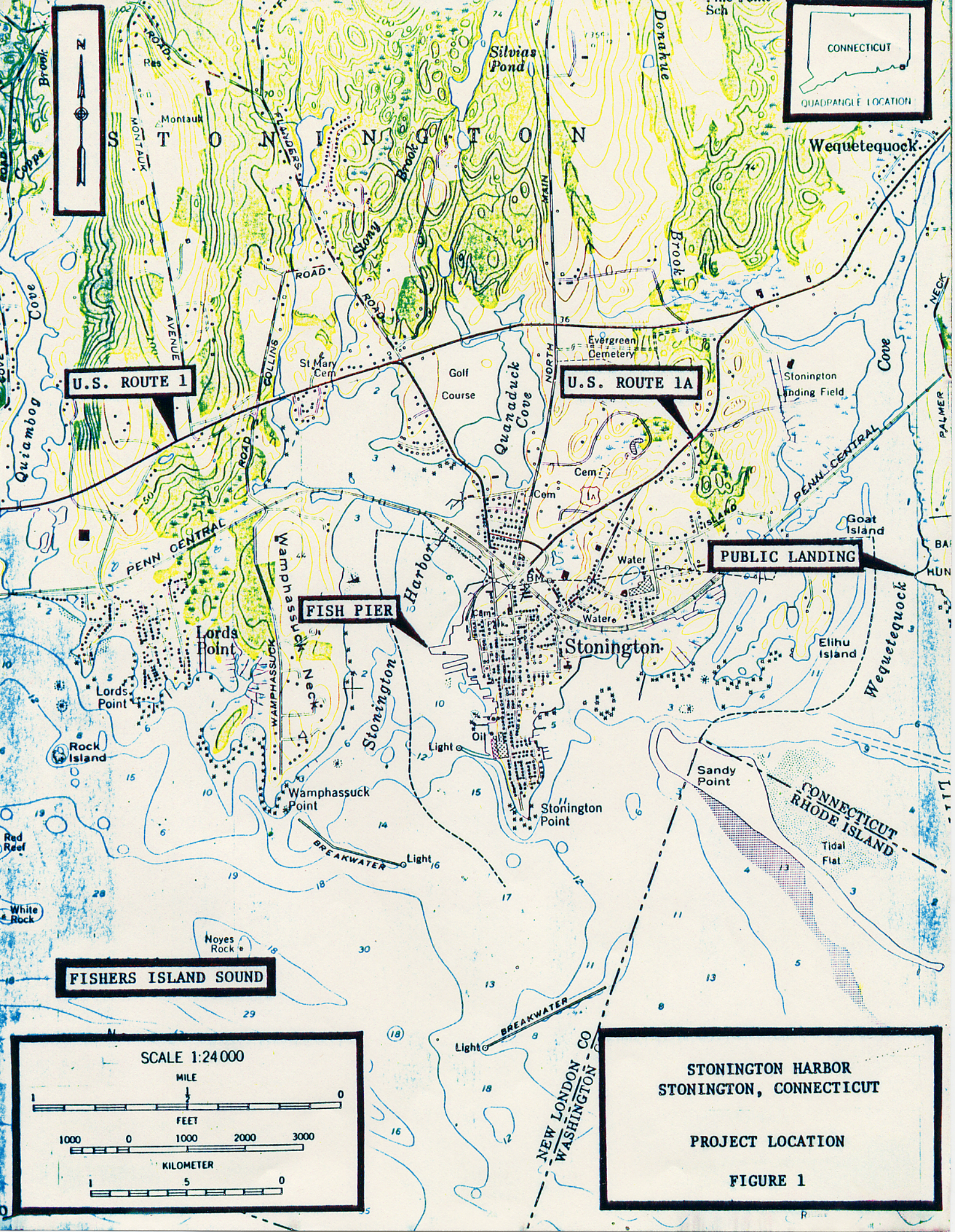
Study Authority

This initial appraisal report was prepared and is submitted under the authority and provisions of Section 107 of the 1960 River and Harbor Act, as amended.

Existing Conditions and Problems

Stonington Harbor lies within the designated coastal zone under the jurisdiction of the Connecticut Department of Environmental Protection (DEP)/Coastal Area Management (CAM) Program. It has a north-south dimension of 1.1 nautical miles and at its widest point, the mouth of the harbor, an east-west dimension of 0.7 nautical miles. There is approximately 4.4 nautical miles of shoreline, not including breakwaters and piers.

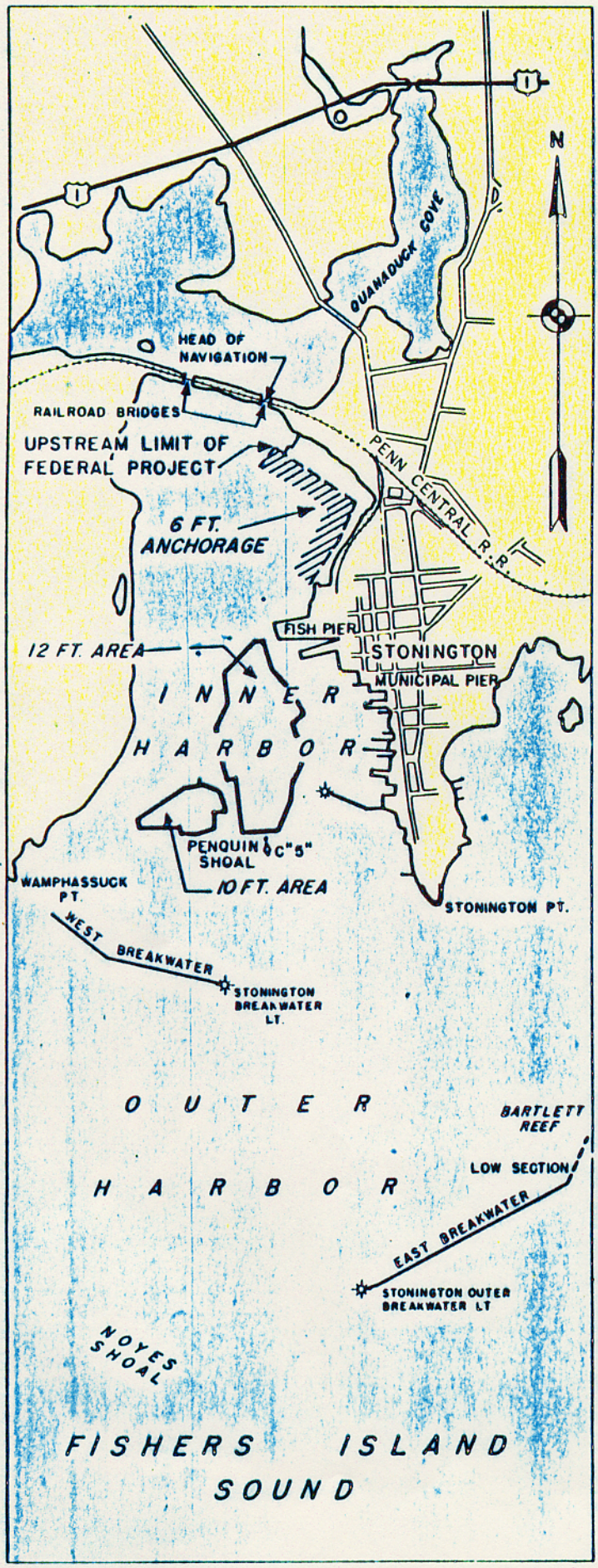
Stonington Harbor is the site of an existing Federal navigation project as shown in Figure 2. The existing project was authorized in 1950 and provides for the maintenance of west and east outer breakwaters constructed in 1880 and 1897 respectively, an inner harbor anchorage approximately 17 acres in size to -12 feet mean low water (mlw), the Penquin Shoal area encompassing approximately 22 acres

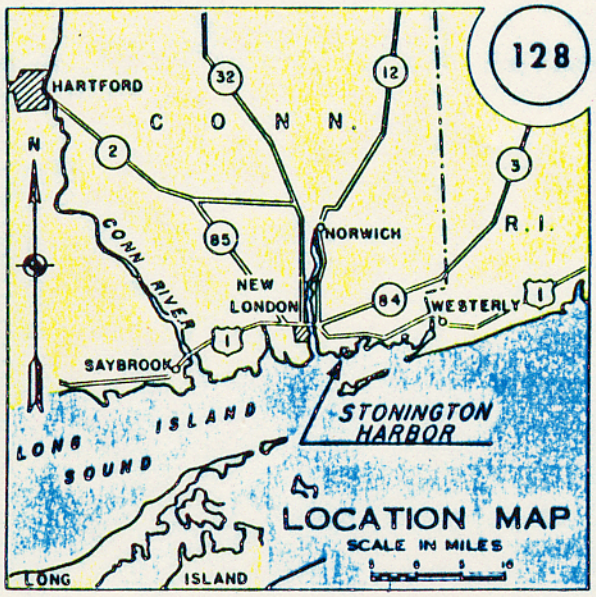


STONINGTON HARBOR
STONINGTON, CONNECTICUT

PROJECT LOCATION

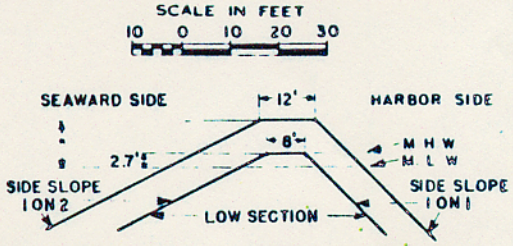
FIGURE 1





INCOMPLETED WORK (INACTIVE)

CROSS SECTION OF BREAKWATERS



* West breakwater is 9.75 ft. above M.L.W.
* East breakwater is 9.00 ft above M.L.W.

STONINGTON HARBOR
STONINGTON, CONNECTICUT

EXISTING FEDERAL PROJECT

FIGURE 2

IN 1 SHEET

SCALE IN FEET

1000 0 1000 2000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

to -10 feet mlw, and a 7 acre anchorage in the northeast corner of the harbor to -6 feet mlw. The existing authorized project was completed in 1957 except for the -6 foot mlw anchorage, which remains in an inactive status.

The eastern shorefront represents the major developed area in terms of docks and commercial shorefront facilities. The majority of its length is well protected either by a beach area on the western side of Stonington Point, or a series of revetements, which include rock walls, sheet piling, and riprap slopes.

The northern portion of the harbor is crossed by an Amtrak railroad bridge that separates Stonington Harbor from a salt marsh and estuarine area to its north. Two passages exist under the bridge for small boats.

The western shoreline consists of rocky bluffs and headlands near Wamphassuck Point to the south, and rocky shorefront with minor escarpments and low lying areas to the north.

Water depths in the harbor are sufficient for the existing recreational and commercial fishing fleets, except along the west and northwest shore. The water depths here shoal abruptly to -4 feet mlw or less, creating a plateau region of 2 to 3-foot depths at mlw.

Three stone breakwaters form a series of protective barriers for the harbor. The short inner breakwater located just north of Stonington Point was originally constructed as a government pier between 1828 and 1834. This breakwater has since been deauthorized as part of the Federal project and is now known as the Monsanto breakwater. The western breakwater was originally proposed as an extension of the Monsanto breakwater, however its intended location was changed to the Wamphassuck Point area further south so as not to restrict the expansion of the fleet. The western outer breakwater was completed in 1880. The eastern outer breakwater was constructed in stages between 1880 and 1897.

The Town Dock is located midway along the eastern shore of the harbor between the town's sewage treatment plant to the north and newly constructed condominiums to the south. The dock consists of two solid filled concrete and rock piers. The north or main dock, is approximately 300 feet long and houses a fish offloading facility on its south face, an ice house and a fish packing facility. A second pier is just south of the main pier and is approximately 420 feet in length. This pier provides some wave shelter to boats moored between the two piers, and affords minimal protection for boats near the offloading facility. Approximately 32 commercial fishing boats are permanently based at the Town Dock. In 1983 there was a waiting list of 10 boats in need of berths. At that time it was estimated that an additional 20 berths were actually needed to satisfy the demand. The fish offloading facilities are also used by transient boats, with the greatest demand during the winter months when an estimated 20 additional boats utilize the Town Dock on a regular basis.

Over the past few years there have been several improvements made at the Town Dock. New piles and decks have been installed on both the north face of the southern pier and the south face of the northern pier, and the ice house has been reconstructed. The recently completed fish packing facility provides capabilities for unloading two vessels at one time, and the water service to the dock area will be improved.

Dredging between the north and south piers is approved and awaiting funds for construction. This would deepen the area for offloading/berthing to a minimum -7 feet mlw closest to shore, with graduated depths down to -15 feet mlw towards the ends of the piers.

Stonington Harbor is an extensively utilized boating resource for both commercial and recreational purposes. Commercial fishing vessels based at the Town Dock range in size from 18 to 72 feet in length. The permanent fishing fleet is comprised of 18 draggers and 14 lobster boats. There are also 5 offshore
lobster boats that operate independently of the fishing fleet based at the Town Dock.

Stonington Harbor is home port to the State's only permanent commercial fishing fleet. In 1983 the harbor accounted for more than one-third of the reported finfish landings in the State and nearly one-half of the lobster catch. Based on annual landings of fish in Connecticut, indications are that the annual landings in Stonington Harbor have doubled to tripled for most of the years between 1974 and 1983 as compared to landings reported in 1974.

Through a State CAM grant, an engineering consulting firm was contracted to develop a Harbor Management Plan to direct the management and development of Stonington Harbor. A final draft was submitted to the town in June 1985.

The problem addressed in this report concerns the feasibility of improving navigation conditions at the Town Dock. As shown in Figure 2 the harbor is aligned north/south and the solid filled town piers are aligned east/west, with the northern pier extending beyond the southern pier. A navigation problem arises as waves and wave surges roll into the harbor from the gap between the east and west outer breakwaters to the south and between Wamphassuck Point and the west outer breakwater to the southwest. The waves and wave surges strike the south face of the southern pier and the south side of the northern pier extension. This creates hazardous conditions for commercial boats attempting to berth and offload along these areas. Due to the Town Dock configuration, this wave/surge action also reverberates between the two piers causing damages to vessels located there. The closer to shore boats are berthed, the lesser degree of damages sustained.

Due to the existing navigation conditions, the south face of the south pier and the south side of the north pier extension are not used for berthing space. The north face of the north pier provides a more sheltered area and some vessels tie-up along this area. However, the dock is in disrepair and is not useable for its entire length.

The wave and surge action creates offloading delays, damages to commercial fishing boats attempting to utilize the services and berth at the Town Dock, and additional downtime of vessels for repairs. During hazardous conditions, some fishermen must move their boats to open water to reduce damages, and fishermen returning to port may incur lengthy delays as they are unable to offload at the Town Dock.

Alternative Plan Chosen For Evaluation

The plan of improvement chosen for evaluation in this report is consistent with pertinent issues and goals presented in Stonington's harbor management study. These issues and goals were developed from input gained through public hearings and questionnaires. The plan consists of implementing management measures and the construction of additional anchorage area. It is proposed that commercial fishing boats now moored at the Town Dock and sustaining wave/surge induced damages be open moored in an anchorage area to be located immediately north of the dock with a controlling depth of -8 feet mlw. No construction dredging would be required as the area proposed to receive these vessels provides sufficient depth. This action would reduce damages sustained by commercial fishing boats, while maintaining their direct access to the Town Dock and its facilities without creating undue interaction with recreational boaters.

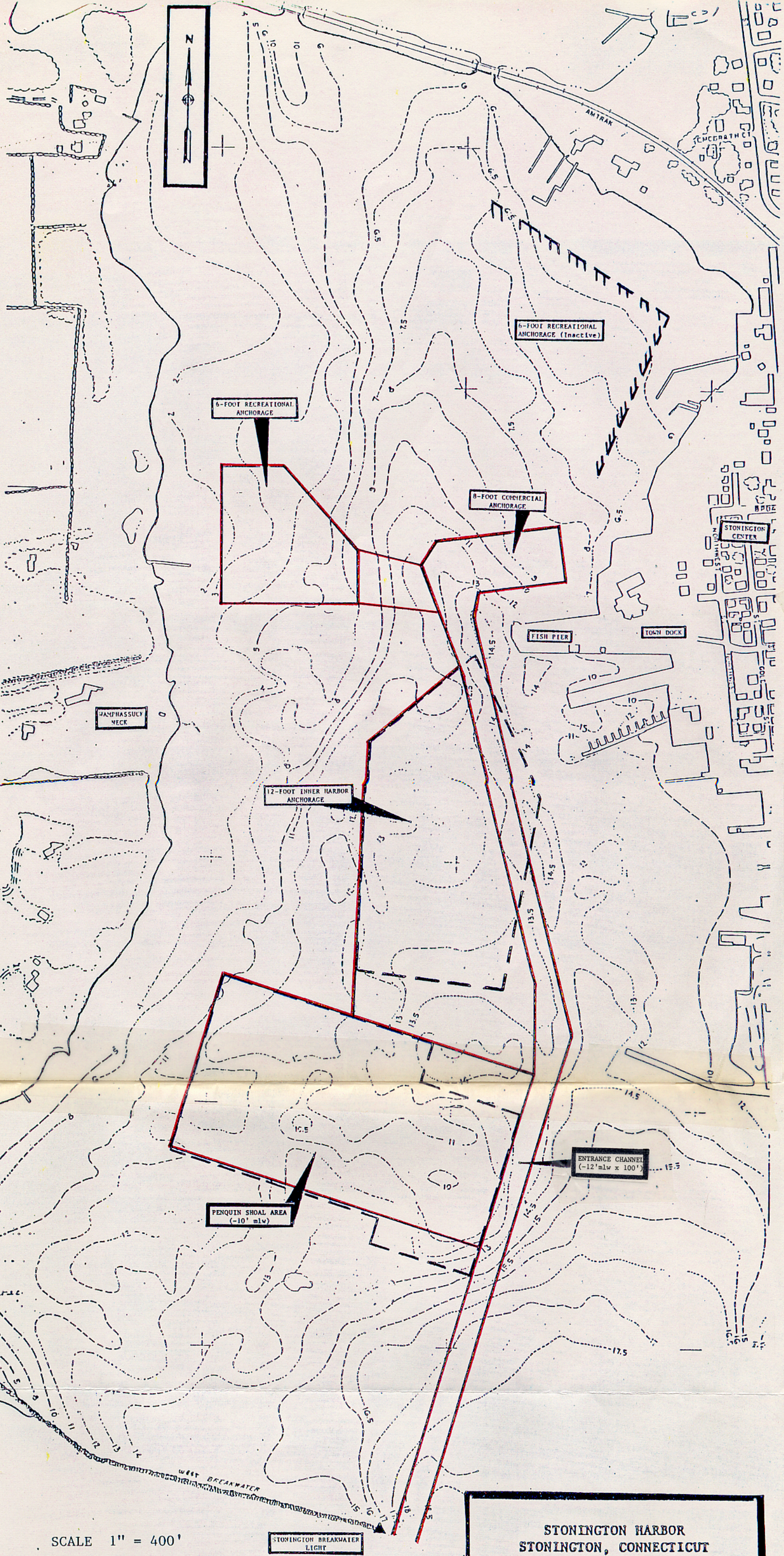
Currently however, the area north of the Town Dock proposed for mooring commercial vessels is occupied during the summer boating season by approximately 30 recreational craft. Stonington Harbor is estimated to be at capacity in terms of placement of moorings in areas with sufficient depth. Additional anchorage area is proposed to be dredged midway along the west side of the harbor across from the Town Dock in an area presently unoccupied due to inadequate depths. The additional anchorage area would accommodate the 30 displaced recreational boats currently moored north of the Town Dock and would be dredged to -6 feet mlw.

To ensure an unobstructed thoroughfare in Stonington Harbor a 100-foot wide entrance channel is proposed. From deep water off the Stonington Breakwater Light to the Town Dock, a -12 foot mlw channel would be aligned so as to take advantage of existing deep water areas within the harbor with minimum impacts on the existing Federal project. From the Town Dock the channel would continue to the commercial anchorage, decrease in depth to -8 feet mlw, and expand to provide a turning basin. A 6-foot access channel connecting the recreational anchorage to the entrance channel, requiring no dredging, is proposed.

The existing 10-foot deep Penquin Shoal area limits would be realigned for simplification of maintenance operations with no change in its size or effectiveness.

The proposed entrance channel would pass through a portion of the inner harbor 12-foot anchorage. To compensate for lost mooring area, the anchorage limits would be expanded.

The proposed Federal plan of improvement is shown in Figure 3.



STONINGTON HARBOR
STONINGTON, CONNECTICUT

EVALUATED PLAN OF IMPROVEMENT

FIGURE 3

Estimate of Project Costs

The following assumptions were made relative to the existing conditions in Stonington Harbor, and the construction of the evaluated plan of improvement.

- The existing depth in the area proposed for dredging is between 1 and 4 feet at mlw.
- The material to be dredged is predominantly clean sand and silty sand. No rock excavation is anticipated.
- The allowable dredging overdepth is 1 foot.
- Disposal of the dredged material is to be at the New London open water site approximately 10 miles from the project (see Figure 4).
- The annual shoaling rate in the project area is 3 percent.
- Existing Aids to Navigation are sufficient.

Based on these assumptions it is estimated that 24,000 cubic yards (cy) of ordinary material would need to be removed. Project construction would be accomplished by a clamshell bucket dredge placing the material into a scow to be transported to the disposal site. Table 1 depicts estimated specific costs for construction of the evaluated plan of improvement.

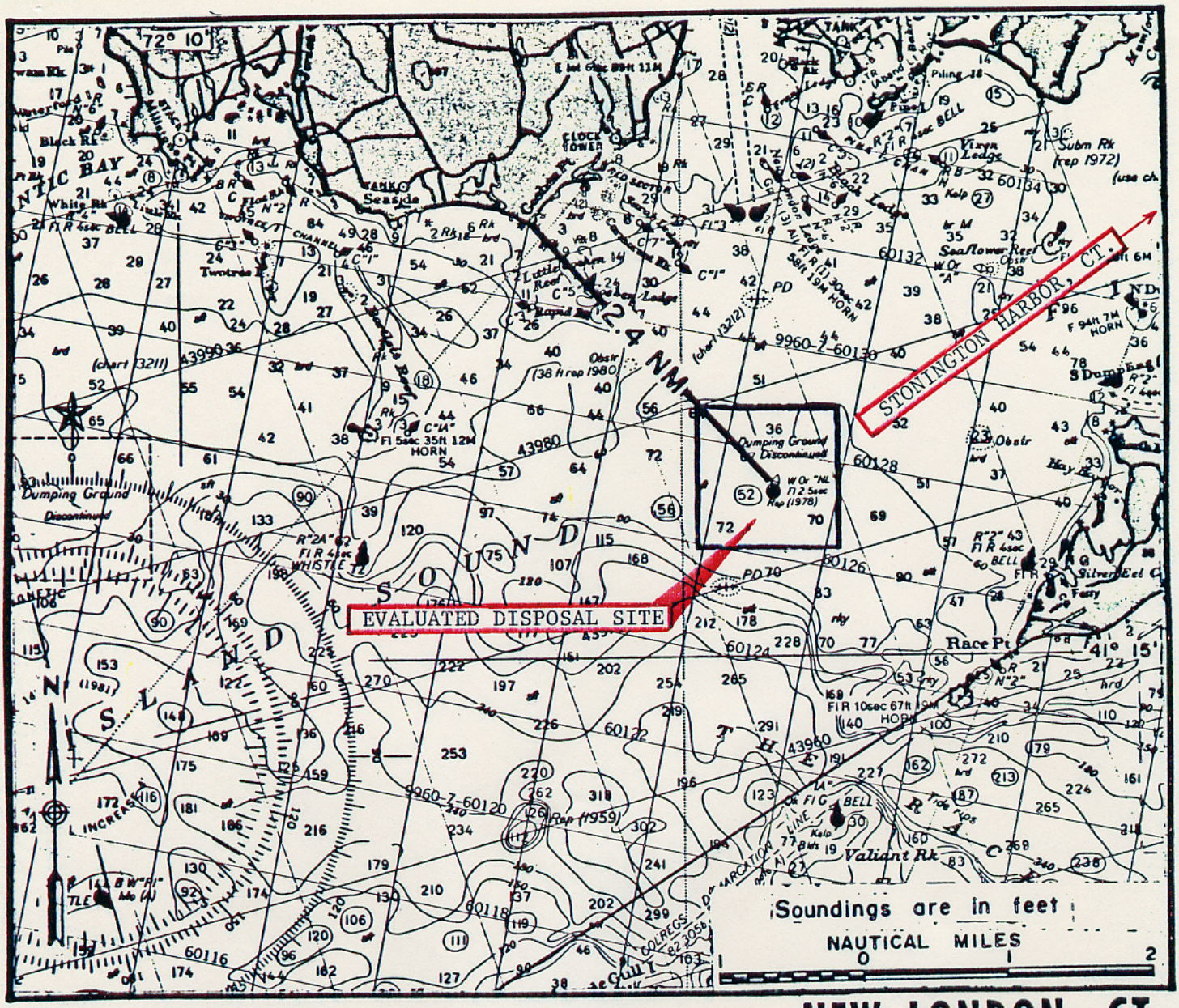
TABLE 1
STONINGTON HARBOR
EVALUATED PLAN OF IMPROVEMENT
ESTIMATED TOTAL INVESTMENT COST

Dredging Anchorage Area	
24,000 cy @ $11.00/cy	$264,000
Contingencies (20%)	53,000
SUBTOTAL	$317,000
Engineering and Design (8%)	25,000
Supervision and Administration (8%)	25,000
TOTAL FIRST COST	$367,000
Interest During Construction	2,000
TOTAL INVESTMENT COST	$369,000

Estimate of Annual Charges

Annual maintenance dredging charges are based on an estimated annual shoaling rate of 3% for the Federal project in Stonington Harbor. This shoal rate will deposit approximately 700 cubic yards of material in the anchorage bottom annually at an estimated maintenance dredging cost of $13.00/cy. Maintenance dredging is estimated to be required twice during the project life or approximately every 17 years. The disposal site for maintenance dredging material is assumed to be the same as for the improvement dredging material. Existing Aids to navigation are sufficient for the proposed project.

Table 2 presents estimated annual charges for the evaluated plan of improvement.



STONINGTON HARBOR
STONINGTON, CONNECTICUT

EVALUATED DISPOSAL SITE

FIGURE 4

TABLE 2
STONINGTON HARBOR
EVALUATED PLAN OF IMPROVEMENT
ESTIMATED ANNUAL CHARGES

Interest and Amortization of First Cost (8 5/8% - 50 years) ($369,000 x 0.08765)	$32,000
Annual Maintenance Dredging	4,000
TOTAL ANNUAL CHARGES	$36,000

Benefit Analysis

Navigation problems in Stonington Harbor are experienced by the commercial fleet based at the Town Dock. The plan of improvement evaluated in this report provides for open water anchorage of the affected commercial fleet. This would eliminate most of the navigation hazards being experienced. The fleet is comprised of 18 draggers, the majority of which are greater than 60 feet in length, and 14 lobster boats ranging up to 45 feet in length. The recreational fleet numbers approximately 400 power and sail craft. Recreational boaters experience only minor inconveniences; hence, only commercial benefits were identified in this report.

The following benefit categories have been assessed for the plan of improvement chosen for evaluation.

Reduction in Damages - As previously discussed, waves and wave surges entering Stonington Harbor cause damages to fishing boats tied up at the Town Dock. Those berthed along the north side of the dock and at the furthest interior berthing spaces between the two piers would incur minimal damages. Those boats out of port or, which are idling in the harbor would sustain no damages. Based on discussions with local fishermen, damage causing conditions occur approximately thirteen times per year. In the worst case a boat could incur several thousand dollars in damages per storm. It is assumed here that about two-thirds of the fishing fleet or 21 vessels would be in danger of damage and that 8 of these would be moved from the pier. Estimating annual damages at $1,000 per vessel for 13 vessels, total damages prevented would be $13,000.

Reduction of Downtime For Repairs - Harbor improvements would reduce damages and also the amount of time fishing boats are laid up for repairs. Assuming 13 boats would forego 2 fishing trips due to downtime for repairs per year, thereby foregoing a catch of 500 pounds of flounder and a net value of $0.40 per pound, the annual net benefits would amount to (13 boats x 2 trips x 500 lbs. x $0.40/lb.) $5,200.

Reduction in Operating Costs -

Elimination of Moving Boats During Storm Conditions: Based on discussions with local fishermen, during times of impending wave and surge problems an estimated 8 boats would have to be moved away from the dock to avoid damages approximately 6 times during the congested summer boating season. Due to the extensive recreational boating presence, commercial vessels must be continuously operated to avoid collisions with boats while they wait out the hazardous conditions at the dock. This results in increased operating expenses, principally wages and fuel. The proposed plan of improvement would provide commercial vessels adequate space to open moor. Boats would be at anchor and would not need to be operated to avoid damages. This would reduce hourly wage expenditures and fuel costs. Based on $8.00 per hour per person, and assuming that half of a typical 4-man crew including captain, or 2 persons, would be operating each boat for 6 hours per incident, a reduction in wage expenses is computed as follows:

(8 boats x 6 events x 6 hrs./event x $16/hr.) = $4,600.

As mentioned, running the boats during hazardous conditions consumes additional fuel. The evaluated plan of improvement would eliminate this operation. Based on a consumption rate of 3 gallons per hour at $1.20/gallon, the boats now being moved would benefit by the following fuel savings:

(8 boats x 6 events x 6 hrs./event x 3 gal./hr. x $1.20/gal.) = $1,000.

Reduced Offloading Delays: Based on conversations with local users, at times of storm or strong surge fishing boats may experience delays of up to two days, averaging one day, in offloading their catch. About one-fourth of the fleet experiences this delay approximately four times during the congested summer boating season. Less running time would result in reduced operating costs. The proposed plan of improvement would provide open anchorage for the affected commercial vessels. Fishing boats returning to port would anchor at their moorings rather than running their boats to avoid sustaining damages at the dock thereby reducing operating costs. The major operating costs being fuel and labor.

Assuming that each of the 8 boats would idle 12 hours, the average fishing day, consuming 3 gallons of fuel per hour, savings in annual fuel costs would be as follows:

(8 boats x 4 events x 12 hrs./event x 3 gal./hr. x $1.20/gal.) = $1,400

Labor cost savings assume that 2 crew members would be operating the vessel during these delays. At an hourly rate of $8.00 per hour for a 12 hour period, the annual labor cost savings is computed below.

(8 boats x 4 events x 12 hrs./event x 2 persons x $8.00/hr.) = $6,100.

The total reduction in operating costs benefit amounts to:
$4,600 + $1,000 + $1,400 + $6,100 = $13,100.

Transfers From Other Harbors - Information furnished by local fishermen indicate that some boats presently based in New Bedford, MA; Newport and Point Judith, R I; and Westport and New Haven, CT; would transfer to Stonington Harbor if navigation improvements were implemented. Boats currently based in New Haven for example, would have better access to fishing grounds, facilities (ice, fish packing, etc.) and markets. A conservative estimate of one transfer vessel is forecasted.

Decreased transit time to and from the fishing grounds would result in lower operating costs (labor and fuel). Based on noted transit times of commercial fishermen at nearby ports as compared to those in Stonington Harbor, an average decrease in travel time of 2.5 hours per trip was determined. Using the same labor ($8.00/hr x 4 crew members) and fuel (3 gal./hr. x $1.20/gal.) costs, and based on a locally obtained average annual 250 fishing trips, benefits due to reduced transit time for the one projected transfer vessel would be:

(1 vessel x 250 trips x 2.5 hrs./trip x $35.60/hr.) = $22,300.

A summary of the total commercial benefits examined in this report is depicted below in Table 3.

TABLE 3
STONINGTON HARBOR
EVALUATED PLAN OF IMPROVEMENT
SUMMARY OF ANNUAL BENEFITS

Reduction in Damages	$13,000
Reduction in Downtime	5,000
Reduction in Operating Costs	13,000
Transfers From Other Harbors	22,000
TOTAL ANNUAL BENEFITS	$53,000

Comparison of Benefits and Costs

A proposed plan's contribution to the national economic development (NED) is measured by comparing annual benefits and costs as a ratio. If the benefit/cost ratio (BCR) is greater than or equal to 1.0, the project is considered to have a net positive effect on the national economic development.

The benefit/cost ratio for the evaluated plan of improvement is presented in Table 4.

TABLE 4
STONINGTON HARBOR
EVALUATED PLAN OF IMPROVEMENT
BENEFIT/COST RATIO
COMPUTATION

Benefits	Annual Costs	B/C Ratio	Net Annual Benefits
$53,000	$36,000	1.5	$17,000

Environmental Considerations

Site investigations and discussions with Federal and State agencies responsible for the protection of the environment, indicate that a project can be developed without significant negative environmental impacts.

Local Cooperation

Cost sharing requirements for the Detailed Project Report and subsequent project design and construction were discussed with the project sponsor, the Town of Stonington. The Town has indicated an intention to meet the Federal cost sharing requirements.

Conclusions

There is an economically and engineeringly feasible plan for modification of the existing Federal navigation project in Stonington Harbor, Stonington, Connecticut. The proposed plan chosen for evaluation would modify the existing authorized Federal project for efficiency purposes, without impacting on the effective intent of the authorized project. Deauthorization of the inactive 6-foot recreational anchorage is being pursued. Local interests support such navigation improvements, which will allow safer and more efficient utilization of the existing Federal navigation project and existing public shore facilities. Detailed analyses will be required before any final recommendation can be made, assuming an economically and environmentally sound solution to identified local problems and needs can be developed.

Recommendation

The Division Engineer recommends further detailed study of navigation improvements in Stonington Harbor, Stonington, Connecticut.